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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,492	09/03/2004	Toshihiko Ushiro	39.049	1386

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EXAMINER
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PEACE, RHONDA S

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 06/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/506,492	Applicant(s) USHIRO ET AL.	
	Examiner Rhonda S. Peace	Art Unit 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6-9, 12, 15 and 16 is/are allowed.
- 6) ☒ Claim(s) 1-5, 10, 11, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>5/10/2006</u>   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/1/2006 has been entered.

### ***Information Disclosure Statement***

The information disclosure statement (IDS) submitted on 5/10/2006 was filed in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

*Claims 11<sub>1</sub> and 14<sub>1</sub> are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

Claims 11<sub>1</sub> and 14<sub>1</sub> recite the limitation "said DLC layer(s)" in lines 4 and 2 respectively. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

*Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) and in further view of Cronk et al (US 6795636).*

*With regard to claim 1*, Yamasaki et al discloses an optical fibers **13B**, **13C**, **13D**, and **13E** having a diffractive films **17B**, **17C**, **17D**, and **17E** respectively, formed upon the end portion of the optical fibers (Figure 6, column 5 lines 50-68, column 6 lines 1-4). However, Yamasaki et al does not disclose the use of a DLC layer, nor a diffractive grating included in the DLC layer, within the diffractive film. Cronk et al discloses the coating of an optical fiber with a transparent DLC through which a diffraction grating is then written, where the diffraction grating contains localized areas of high refractive index and low refractive index (column 5 lines 60-67, column 6 lines 1-7 and 39-45, column 13 lines 55-67, column 14 lines 15-24 and 35-45, column 18 lines 20-46). It would have been obvious to one of ordinary skill in the art to combine the above teachings to produce an optical fiber with a diffraction film upon its end face, where the film consists of the DLC layer and corresponding diffractive grating as taught by Cronk et al, as the addition of this DLC layer imparts strength to the structure and allows for the formation of high quality gratings (Cronk: column 2 lines 15-25, column 14 lines 16-24), as well as allowing the structure to be simplified (Yamasaki et al: column 1 lines 20-29).

*Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) and in further view of Cronk et al (US 6795636).*

*Pertaining to claim 2, Yamasaki et al and Cronk et al disclose the device as previously described. In addition, Yamasaki et al shows in Figure 6 that the diffractive films 17B, 17C, 17D, and 17E are capable of splitting a beam, originating from optical fiber 13A and having a plurality of wavelengths, into a plurality of beams containing a single wavelength (column 5 lines 50-68, column 6 lines 1-4). This device as shown in Figure 6 would also function to combine the beams having differing wavelengths into a single beam with a plurality of wavelengths if operation was reversed, as is known since Yamasaki et al refers to the device as a multiplexer/demultiplexer (column 4 lines 62-65).*

*Claim 3 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Yamasaki et al (US 4693544) in view of Cronk et al (US 6795636), and in further view of Iizuka et al (US 6388811).*

*Applicable to claim 3, the optical diffractive film device, as produced by the combined teachings of Yamasaki et al and Cronk et al, is described above. However, Yamasaki et al and Cronk et al do not disclose the specific function of allowing a single wavelength beam to be split into a plurality of beams, as well as causing a plurality of single wavelength beams to be combined into a single beam. Iizuka et al discloses an optical diffractive grating, formed of local areas of high and low refractive index. The diffractive grating allows a single wavelength beam to be split into a plurality of beams, as well as causes a plurality of single wavelength beams to be combined into a single*

beam (column 2 lines 28-45). It would have been obvious to one of ordinary skill in the art to combine the teachings of Yamasaki et al, Cronk et al and Iizuka et al, as they illustrate the functions the optical film of Yamasaki et al and Cronk et al are capable of, as they themselves have a diffraction grating. In addition, the strength of the "DLC" layer of Cronk et al would impart additional strength to the diffraction grating of Iizuka et al (Cronk et al: column 14 lines 16-24).

*Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) in view of Cronk et al (US 6795636), and in further view of Hida et al (US 2004/0247243).*

*Pertaining to claims 4 and 5, the optical diffractive film device, as produced by Yamasaki et al in view of Cronk et al, is described above. However, Yamasaki et al and Cronk et al do not disclose the specific functions of acting as a polarization-division multiplexer/demultiplexer, and acting as a wave-plate with respect to TE and TM waves. Hida et al discloses a waveguide diffraction-type multiplexer/demultiplexer having polarization-division functionality (paragraph 0006-0008, Figure 1). The diffraction-type multiplexer/demultiplexer is capable of combining TE and TM waves and separating TE and TM waves (paragraph 0061, 0066, 0073, Figure 5). In addition, the diffraction-type multiplexer/demultiplexer has wave-plate functionality with respect to TE and TM waves (paragraphs 0066 and 0068, Figure 5). It would have been obvious to one of ordinary skill in the art to combine the teachings of Yamasaki et al, Cronk et al, and Hida et al, as the strength of the DLC layer(s) of Cronk et al would impart additional strength to the structure of Hida et al (Cronk et al: column 14 lines 16-24).*

*Claim 10 (as dependent upon claim 1, and further referred to as 10<sub>1</sub>), 11<sub>1</sub>, 13<sub>1</sub>, and 14<sub>1</sub> are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamasaki et al (US 4693544) and in further view of Cronk et al (US 6795636).*

*Referring to claim 10<sub>1</sub>, Yamasaki et al, in view of Cronk et al, disclose the device as previously outlined. Yamasaki et al, in view of Cronk et al do not disclose the specific functional limitations of the device being operation between wavelengths 0.8 microns and 2.0 microns. However, Yamasaki et al discloses the optical diffraction film for use in multiplexer/demultiplexer, optical switch or optical coupler, all which utilize a wide range of wavelengths, including between 0.8 microns and 2.0 microns. Therefore, it would have been obvious to one of ordinary skill in the art to fashion an optical diffraction film that may be utilized within this range, as it is a range utilized by optical system for which the device is designed.*

*Pertaining to claim 11<sub>1</sub>, Yamasaki et al, in view of Cronk et al, disclose the device as previously outlined. In addition, Cronk et al discloses forming high refractive index regions within the DLC material by irradiating the DLC material in a predetermined pattern with an energy beam to raise the refractive index of the irradiated portion of the DLC material (column 14 lines 15, 16, and 35-64, column 17 lines 1-21, column 18 lines 20-46).*

*Concerning claim 13<sub>1</sub>, Yamasaki et al, in view of Cronk et al, disclose the device as previously outlined. In addition, Cronk et al discloses the energy beam for writing the diffraction grating within the DLC layer may be an electron beam, X-ray beam, or an ion beam (column 7 lines 53-67, column 8 lines 1-3).*


Art Unit: 2874

*With respect to claim 14<sub>1</sub>, Yamasaki et al, in view of Cronk et al, disclose the device as previously outlined. In addition, Cronk et al discloses the DLC layer may be deposited upon the optical fiber using a plasma CVD method (column 11 lines 20-49).*

***Allowable Subject Matter***

*Claims 6-9, 10<sub>6</sub>, 11<sub>6</sub>, 12, 13<sub>6</sub>, 14<sub>6</sub>, 15, and 16 are allowed.*

The following is an examiner's statement of reasons for allowance: The applicable prior art discussed within this Office Action does not disclose, nor does it reasonably suggest an optical fiber comprising numerous diffraction gratings formed upon the end face of the fiber, where the first diffraction grating containing DLC has polarization-division demultiplexing functionality for splitting TE and TM waves, and the second diffraction grating containing DLC has wave plate functionality with respect to either TE or TM waves. It is the examiner's opinion that these limitations of claim 6 constitute allowable subject matter, as do claims 7-9, 10<sub>6</sub>, 11<sub>6</sub>, 12, 13<sub>6</sub>, 14<sub>6</sub>, 15, and 16, as they are either directly or indirectly dependent upon allowable claim 6.

 ~~Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."~~

***Response to Arguments***

Applicant's arguments, see pages 7-9, filed 5/1/2006, with respect to the rejection(s) of claim(s) 1-5 and 10<sub>1</sub> under 35 U.S.C. § 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon



Art Unit: 2874

further consideration, a new ground(s) of rejection of independent claim 1, as well as its dependent claims, is made primarily in view of Yamasaki et al in further view of Cronk et al.

*JW* In the Office mailed <sup>02/01/2006</sup>~~10/17/2005~~, claims 11<sub>1</sub>, 13<sub>1</sub>, and 14<sub>1</sub> were incorrectly

allowed, as these claims are dependent upon claim 1, which was rejected in the Office

*JW* Action mailed <sup>02/01/2006</sup>~~10/17/2005~~. Therefore, in the Office Action mailed <sup>02/01/2006</sup>~~10/17/2005~~, claims

11<sub>1</sub>, 13<sub>1</sub>, and 14<sub>1</sub> should have instead been objected to as containing allowable subject matter but being dependent upon a rejected claim. The Examiner apologizes for any confusion regarding these claims. Nonetheless, due to the newly found prior art Cronk et al, which discloses the limitations of Applicant's claims 11<sub>1</sub>, 13<sub>1</sub>, and 14<sub>1</sub>, the indication of allowable subject matter is withdrawn, and claims 11<sub>1</sub>, 13<sub>1</sub>, and 14<sub>1</sub> currently stand rejected under Yamasaki et al in further view of Cronk et al.

### **Conclusion**


The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Jin et al (US 5999671) discloses a tunable long-period optical grating device. David et al (US 5948166) discloses a process and apparatus for depositing a carbon-rich coating on a moving substrate. Dorfman et al (US 5718976) discloses erosion resistant diamond-like nanocomposite coatings for optical components. DiVita et al (US Reg. Number H1461) discloses abrasion resistant diamond-like coating for optical fibers and associated methods of forming such a coating. Dorfman et al (US 5352493) discloses a method of forming a diamond-like nanocomposite or doped-diamond-like nanocomposite films.

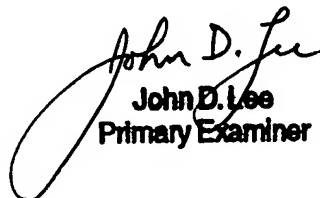
Art Unit: 2874

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda S. Peace whose telephone number is (571) 272-8580. The examiner can normally be reached on M-F (8-5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272- 2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Rhonda S. Peace  
Examiner  
Art Unit 2874

  
John D. Lee  
Primary Examiner